

Thickness dependence of ferromagnetic Fe doped Zn-Mg-Fe-O films

Seung-Iel Park, Geun Young Ahn, In-Bo Shim, and Chul Sung Kim*

Department of Physics, Kookmin University, Seoul 136-702, Korea

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Fe doped Zn-Mg-Fe-O thin films were prepared by rf-magnetron sputtering with a substrate temperature at 500 °C on Si(100) and were annealed at 550 °C for 1 hour in Ar atmosphere. The thickness of Zn-Mg-Fe-O films were found to be about 450 ~ 3500 Å by cross section images of scanning electron microscopy. The structure, electric and magnetic properties of the Zn-Mg-Fe-O films have been studied with X-ray diffraction, X-ray photoemission spectroscopy, vibrating sample magnetometer, atomic force microscope, and temperature dependence of resistance measurement. The Zn-Mg-Fe-O films indicate a ferromagnetic phase at room temperature. In the Zn-Mg-Fe-O film with 3500 Å, the magnetization value is 0.023 emu/cm³ under the 5 kOe applied field.